

# NASA TECH BRIEF

*Lyndon B. Johnson Space Center*



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

## Continuous Detection of Viable Micro-Organisms by Chemiluminescence

### The problem:

Reclaimed drinking water must be constantly monitored for live, or viable, micro-organisms. Therefore a system is needed which could warn people that reclaimed water is no longer sterile. The standard equipment used for detecting bacteria is not suitable for continuous monitoring. It takes too much time and effort to run frequent tests of the water samples. In the interim the water may become dangerously contaminated.

### The solution:

A new system was developed which monitors reclaimed water continuously. It can also be applied as a monitor in food-processing industries.

### How it's done:

In the new system, water samples are processed automatically. The processed samples are incubated to speed up the growth of any bacteria that may be present. The incubated samples are then compared with uninoculated ones by measuring their respective chemiluminescences. A more intensive signal from an incubated sample indicates that live micro-organisms are present. Chemiluminescence is produced by the reaction of bacterial porphyrins with a luminol/hydrogen peroxide mixture.

Disposable filter capsules are utilized in the new system for processing the individual water samples. The filter capsules, each containing a sterile membrane filter, are dispensed automatically from a cassette onto a continuous chain transport which

conveys them from one station to another. Liquids are introduced by means of a hypodermic needle which pierces a rubber septum in the bottom of the capsule.

During the processing cycle, discrete volumes of the respective reagents are dispensed by syringe pumps from pressurized storage tanks. The processing sequence involves sample filtration, nutrient addition, incubation, washing with 4 M urea, and reaction with the luminol/hydrogen peroxide reagent at the readout station. The intensity of the luminescence produced by the reaction is monitored by a photomultiplier tube with the processed signal displayed on a strip chart recorder.

### Note:

Requests for further information may be directed to:

Technology Utilization Officer  
Johnson Space Center  
Code AT3  
Houston, Texas 77058  
Reference: TSP75-10170

### Patent status:

NASA has decided not to apply for a patent.

Source: S. Witz, C. Linnecke, and  
W. Hartung of  
AMB Company  
under contract to  
Johnson Space Center  
(MSC-14762)

Categories: 05 (Life Sciences)  
02 (Electronics Systems)  
06 (Mechanics)